REMARKS/ARGUMENTS

In response to the Office Action dated June 30, 2003, which was made final, claims 1 and 21 are amended, and claims 2 and 22 are canceled without prejudice, waiver, or disclaimer to the subject matter contained therein. Claims 1, 3-9, 21, and 22-29 are pending in the application. It is not the Applicant's intent to surrender any equivalents because of the amendments or arguments made herein. Reconsideration of the application, and entrance of these amendments, are respectfully requested.

Art-Based Rejections

In paragraph 2 of the Office Action, claims 1, 2, 6-9, 21, 22, and 26-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nagate et al. in view of Matsuo et al.

In paragraph 3 of the Office Action, claims 3-5 and 23-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nagate et al. in view of Matsuo et al. and further in view of Narita et al.

The Applicant respectfully traverses the rejections in light of the amendments above and the arguments below.

The Nagate Reference

The Nagate reference discloses an efficient permanent magnet rotor for brushless motor. A permanent magnet rotor 1 has a column yoke 2 and a pair of plate permanent magnets 3, 3 for a field. The yoke 2 is formed by laminating a large number of steel sheets 4, 4 into one body. The yoke 2 has four magnetic poles

5 (5a, 5b, 5c and 5d) protruding outward radially formed on the outer periphery. See Nagate, Col. 2, lines 40-45.

FIG. 2 is a sectional view of a permanent magnet rotor, showing a cross section in a direction intersecting at right angles to the rotatable shaft of the yoke 2. The slots 6, 6 are bases of the magnetic poles 5a, 5c of the yoke 2 and disposed at substantially equal distance from the rotatable shaft. The permanent magnets 3, 3 for the field are disposed with their faces having the magnetism of N pole opposed to each other. See Col. 2, line 63 – Col. 3, line 2.

The permanent magnets 3, 3 for the field have their surfaces partly engages with one side of the protuberances 9 when press-fitted, and the protuberances 9 suffer from deflection or plastic deformation in the outward directions R due to a dimensional difference of the magnets and are held within the slots 6, 6. See Col. 8, lines 20-24.

The Matsuo Reference

The Matsuo reference is cited as disclosing a bond magnet formed from a plate-shaped bond magnet.

The Narita Reference

The Narita reference discloses a permanent magnet rotor type electric motor. Narita is cited for disclosing a rotor wherein each of the slits has an opening in a V shape.

The Claims are Patentable over the Cited Reference

The claims of the present invention describe a rotor for a permanent magnet embedded motor. The rotor comprises a rotor core made of magnetic material and having a plurality of slits formed at corresponding poles, and at least one bond magnet embedded in at least one of the slits, wherein the at least one bond magnet is formed from a plate-shaped bond magnet, wherein a length dimension and a width dimension of the at least one bond magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits, and the at least one bond magnet is fitted in the at least one of the slits under pressure.

Another embodiment of the rotor of the present invention comprises a rotor core comprising a plurality of stacked plates of a magnetic material and having a plurality of slits formed at corresponding poles, and at least one bond magnet embedded in at least one of the slits, wherein the at least one bond magnet is formed from a plate-shaped bond magnet, wherein a length dimension and a width dimension of the at least one bond magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits, and the at least one bond magnet is fitted in the at least one of the slits under pressure, and an outer peripheral face of the at least one bond magnet is fitted into an entire inner peripheral face of the plurality of stacked plates of the rotor core wherein no space is left between the bond magnet and the stacked plates regardless of an unevenness of the inner peripheral face of the plurality of stacked plates of the rotor core.

The cited references do not teach nor suggest the limitations of the claims of the present invention. Specifically, the cited references do not teach nor suggest the limitation of a length dimension and a width dimension of the at least one bond

magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits, and further, the cited references do not teach nor suggest the limitation of an outer peripheral face of the at least one bond magnet is fitted into an entire inner peripheral face of the plurality of stacked plates of the rotor core wherein no space is left between the bond magnet and the stacked plates regardless of an unevenness of the inner peripheral face of the plurality of stacked plates of the rotor core as recited in the claims of the present invention.

Length and Width Dimension

The primary Nagate reference cannot have a length dimension and a width dimension of the at least one bond magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits as claimed in the present invention. FIGS. 1 and 2 of Nagate illustrates the slit as being larger than the magnet in at least one direction, since the magnet 3 must fit within the slit, and space is shown for the deflection of the protuberances 9 within the slit. See FIGS 1 and 2, and Col. 2, line 63-Col. 3, line 2. As such, the Nagate reference does not teach nor suggest the limitation of the at least one bond magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits as claimed in the present invention.

Neither of the ancillary Matsuo or Narita references cure the deficiency of the Nagate reference, namely, neither the Matsuo nor Narita references teach nor suggest the limitation of the at least one bond magnet in a cross-section orthogonal to an axis of the rotor are both greater than a corresponding dimension of the at least one of the slits as claimed in the present invention.

As such, independent claims 1 and 21 are patentable over the cited references for at least this reason.

Claim 21

Further, independent claim 21 contains the limitation of an outer peripheral face of the at least one bond magnet is fitted into an entire inner peripheral face of the plurality of stacked plates of the rotor core wherein no space is left between the bond magnet and the stacked plates regardless of an unevenness of the inner peripheral face of the plurality of stacked plates of the rotor core.

The primary Narita reference teaches that the permanent magnets 3, 3 for the field have their surfaces partly engaged with one side of the protuberances 9 when press-fitted, and the protuberances 9 suffer from deflection or plastic deformation in the outward directions R due to a dimensional difference of the magnets and are held within the slots 6, 6. See Col. 8, lines 20-24. Such an air gap, which is shown in both FIGS. 1 and 2 of Narita, lead to a lower magnetic efficiency of the motor, because the protuberances 9 will lift the magnet 3 at least partially away from the surface, and air gaps created by notch 11. Further, such air gaps must be larger when the magnet used is not a bond magnet and the rotor core is formed by a plurality of stacked steel plates, further teaching away from the claims of the present invention.

As such, Narita cannot teach nor suggest the limitation of an outer peripheral face of the at least one bond magnet is fitted into an entire inner peripheral face of the plurality of stacked plates of the rotor core wherein no space is left between the bond magnet and the stacked plates regardless of an unevenness of the inner peripheral face of the plurality of stacked plates of the rotor core as recited in the claims of the present invention.

Again, neither of the ancillary Matsuo or Narita references cure the deficiency of the Nagate reference, namely, neither the Matsuo nor Narita references teach nor suggest the limitation of an outer peripheral face of the at least one bond magnet is fitted into an entire inner peripheral face of the plurality of stacked plates of the rotor core wherein no space is left between the bond magnet and the stacked plates regardless of an unevenness of the inner peripheral face of the plurality of stacked plates of the rotor core as recited in the claims of the present invention.

As such, independent claims 1 and 21 are patentable over the cited references. Claims 3-9 and 23-29 are also patentable, not only because they contain all of the limitations of the independent claims, but because they recite additional novel features not found in the prior art.

Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6742 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
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